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**METHOD AND SYSTEM FOR VISUALLY  
REPRESENTING TELEPHONE CALL TREE INTERFACE**

**BACKGROUND OF THE INVENTION**

**1. Technical Field:**

The present invention relates generally to telephony, and in particular, but not exclusively, to a method and system for visually representing call tree interfaces for interaction by users of telephones such as, for example, wire-line telephones, wireless telephones, data network telephones, or Internet Protocol (IP) telephones.

**2. Description of Related Art:**

Automated telephone answering systems are typically software applications that answer and process incoming telephone calls. So-called "call path" or "call tree" systems are automated telephone answering systems used by businesses to reduce the costs of answering customers' calls. However, these cost reductions are usually offset by the inconveniences forced on the customers, who typically have to wade through a long, confusing and sometimes frustrating maze of options in menu form. These menus of options are commonly referred to as "call trees".

A significant drawback of existing call tree systems is that they typically require callers to make multiple attempts before they can traverse the menu options

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successfully. For example, in the health care field, a patient might submit a payment request to an insurance provider for services performed by a healthcare provider. If the healthcare provider fails to submit the appropriate paperwork to the insurance provider in order to support the alleged services performed, the insurance provider might reject the patient's submission. Typically, the patient's only recourse is to call the insurance provider. If the insurance provider's answering system uses a complicated and/or confusing call tree, having to navigate such a complicated or confusing call tree only exacerbates the patient's concern and frustration about the rejected payment request.

Another drawback of existing call tree systems is that significantly different call trees are typically used in similar technologies. For example, a call tree used for voice mail in a cellular telephone system can be significantly different than the call tree used for voice mail in the wire-line telephone system within the same region.

Therefore, it would be advantageous to have an improved method and system that allows a caller to interact with and modify a call tree, and thereby make it easier and quicker for the caller to navigate the call tree options successfully.

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### **SUMMARY OF THE INVENTION**

The present invention provides a method, system and computer instructions for visually representing telephone call tree interfaces for interaction by users of telephones, such as, for example, wire-line telephones, wireless telephones, data network telephones, or IP telephones. A caller can connect to an automated telephone answering service, and view a display of an interactive, visual interface for a call tree. The display can depict actions that can be taken with respect to the nodes of the call tree. The visual interface can show details about one or more nodes of the call tree, and the caller can select a node for interaction and enter a wait queue associated with the selected node. For example, the caller can use a wire-line telephone, wireless telephone, data network telephone, or IP telephone to interact with, navigate and/or modify the displayed call tree.

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### **BRIEF DESCRIPTION OF THE DRAWINGS**

The novel features believed characteristic of the invention are set forth in the appended claims. The invention itself, however, as well as a preferred mode of use, further objectives and advantages thereof, will best be understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawings, wherein:

**Figure 1** is a system diagram illustrating a plurality of interconnected, heterogeneous networks in which the present invention may be implemented;

**Figure 2** is a pictorial diagram of a wireless telephone that can be used for implementing a preferred embodiment of the present invention;

**Figure 3** is a block diagram of a wireless telephone, such as any of the wireless telephones illustrated in **Figure 2**;

**Figures 4A** and **4B** are related exemplary screens of display that illustrate principles of the present invention; and

**Figure 5** is a flowchart of a process for visually representing an interactive telephone call tree in accordance with a preferred embodiment of the present invention.

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**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

With reference now to the figures, and in particular with reference to **Figure 1**, a system diagram illustrating a plurality of interconnected, heterogeneous networks in which the present invention may be implemented is depicted. As illustrated, exemplary system **100** includes IP network **102**, Local Area Network (LAN)/Wide Area Network (WAN) **104**, Public Switched Telephone Network (PSTN) **109**, cellular wireless network **112**, and satellite communications network **116**. As such, system **100** makes up a plurality of heterogeneous networks, and one or more of these networks can be used to implement the present invention.

IP network **102** can be a publicly available IP network, a private IP network, or a combination of public and private IP networks. In any case, IP network **102** operates according to the Internet Protocol and can route packets through its numerous switches and transmission paths. IP networks are generally known in the art to be expandable, fairly easy to use and heavily supported. Coupled to IP network **102** is Domain Name Server (DNS) **108** to which queries may be sent, with such queries each requesting an IP address based upon a Uniform Resource Locator (URL). IP network **102** can support 32 bit IP addresses as well as 128 bit IP addresses.

LAN/WAN **104** is coupled to IP network **102** via proxy server **106** (or any other appropriate connection). LAN/WAN **104** can operate according to various

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communication protocols, such as the Internet Protocol, the Asynchronous Transfer Mode (ATM) protocol, or other known packet switched protocols. Proxy server 106 functions primarily to route data between IP network 102 and LAN/WAN 104. A firewall that precludes unwanted communications from entering LAN/WAN 104 may also be located at the site of proxy server 106.

Computer 120 is coupled to LAN/WAN 104 and supports communications with LAN/WAN 104. Computer 120 can employ LAN/WAN 104 and proxy server 106 to communicate with other devices across IP network 102. Such communications are generally known in the art and will not be further described herein except to expand upon the teachings of the present invention. Also, phone 122 can be coupled to computer 120 and employed to initiate IP Telephony communications with another phone or voice terminal using the IP Telephony functions available. In such an IP telephony system, a service provider can deploy a gatekeeper (not shown) to manage IP telephony for its users. IP phone 154 connected to IP network 102 (or other phone, such as, for example, phone 124) can be used to communicate with phone 122 using IP telephony.

PSTN 109 is a circuit switched network that is employed primarily for voice communications, such as those enabled by standard phone 124. However, PSTN 109 can also support the transmission of data. Data transmissions may be supported to a tone-based terminal, such as facsimile (FAX) machine 125, a tone-based modem contained in computer 126, or another device that can be

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coupled to PSTN 109 via a digital connection, such as an Integrated Services Digital Network (ISDN) line, an Asynchronous Digital Subscriber Line (ADSL), or another appropriate digital connection to a terminal that supports such a connection. As illustrated, a voice terminal, such as phone 128, can be coupled to PSTN 109 via computer 126 rather than being supported directly by PSTN 109, as can be the case with phone 124. Thus, for example, computer 126 can support IP telephony with voice terminal 128.

Cellular network 112 supports wireless communications with terminals operating within its service area (e.g., providing coverage for a city, county, state, country, etc.). Cellular network 112 can include a plurality of base transmitter system (BTS) towers (e.g., tower 130), and each such tower can define and service radiotelephone or wireless communications within a respective cell. Wireless terminals operate in conjunction with cellular network 112 and can include wireless handsets 132 and wireless-enabled laptop or personal computers 134, for example. Wireless handsets 132 can be, for example, personal digital assistants (PDA's), radiotelephones, wireless or cellular telephones, or two-way pagers. Cellular network 112 can be coupled to IP network 102 via gateway 114.

Wireless handsets 132 and wireless-enabled laptop or personal computers 134 can communicate with cellular network 112 using, for example, a wireless application protocol (WAP). The WAP is an open, global specification

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that allows mobile users with wireless devices, such as, for example, mobile phones, pagers, two-way telephones, radiotelephones, smart-phones, communicators, PDA's, and portable laptop or similar personal computers, to easily and almost instantly access and interact with network provided information and services. The WAP is a communications protocol and application environment and can be built on any operating system (OS) including, for example, Palm OS, EPOC, Windows CE, FLEXOS, OS/9, and a Java OS. The WAP can also provide interoperability between different families of devices.

Furthermore, the WAP is a wireless equivalent of Hypertext Transfer Protocol (HTTP) and Hypertext Markup Language (HTML). The HTTP-like component of the WAP defines the communication protocol between the handheld device and a server or gateway. This component addresses characteristics that are unique to wireless devices, such as data rate and round-trip response time. The HTML-like component of the WAP, Wireless Markup Language (WML), defines markup and scripting languages for displaying information to, and interacting with, the users. The WML component of the WAP is highly focused on the limited display size and limited input devices available on small, handheld devices. For example, a typical cell phone may have a 4x10-character display with 16-gray levels, a numeric keypad, and up/down volume keys.

Cellular network 112 operates according to a particular mobile radiotelephone operating standard, which can be, for example, an Advanced Mobile Phone



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System (AMPS) standard, Digital-AMPS (D-AMPS) standard, Code Division Multiple Access (CDMA) standard, Time Division Multiple Access (TDMA) standard, Global System for Mobile Communications (GSM) standard, or any other appropriate mobile radiotelephone operating standard. As such, independent of the standards supported by cellular network 112, cellular network 112 can support voice and data communications with terminal units, such as, for example, terminals 132 and 134.

Exemplary satellite network 116 includes at least one satellite dish 136 that operates in conjunction with one or more satellites 138 to provide satellite communications with a plurality of terminals, such as, for example, laptop or personal computer 142 and satellite handset 140. Also, satellite handset 140 can be a two-way pager. Satellite network 116 can be serviced by one or more geo-synchronous orbiting communications satellites, a plurality of medium earth orbit (MEO) communications satellites, or a plurality of low earth orbit (LEO) communications satellites. In any case, satellite network 116 can provide voice and data communications and services and can be coupled to IP network 102 via gateway 118.

Wireless Proxy 160 can be coupled to IP network 102 and also to a plurality of transmission/reception towers (e.g., tower 162), each of which can provide wireless communications with wireless devices such as, for example, wireless device 164. Wireless Proxy 160 can provide access to IP network 102 for wireless device 164.

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For example, wireless device **164** can be a PDA or wireless telephone, which may require proprietary or other special protocols in order to communicate with IP network **102**.

For example, wireless proxy server **160** can be a 3Com server utilizing 3Com protocols for communicating with a Palm VII, which is a handheld, portable computing device available from 3Com Corporation in Santa Clara, California.

Also, wireless proxy **160** can be a 3Com proxy server supporting communications with, for example, a Palm VII personal organizer, and portable computing device **164** can be a Palm VII personal organizer. As such, communications between wireless proxy server **160** and portable computing device **164** can be facilitated by the use of Palm Query Applications (PQAs).

A PQA is similar to a mini-Web site that can reside on portable computing device **164**. In other words, a PQA can be a special type of records database. A typical PQA can contain an HTML form, or a list of hyperlinks that request additional information either locally on personal computing device **164** or remotely via the Internet. As such, PQAs are available that can access targeted bits of Internet information, similar to clippings from a newspaper. Typically, a handheld computer user does not focus on following hyperlinks to the Internet (although this is available), but instead, a typical user composes a simple query in a PQA (for example a request for a stock quote), and then sends that query over the airwaves.

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In any event, the configurations and operations of the networks shown in **Figure 1** are described herein for illustrative and explanatory purposes only, and are intended as examples and not as architectural limitations for the processes of the present invention.

With reference now to **Figure 2**, a pictorial diagram of a wireless telephone is depicted that can be used for implementing a preferred embodiment of the present invention. Wireless telephone **200** can include display **202** for presenting at least textual and graphical information. Display **202** can be a known display device, such as a liquid crystal display (LCD), plasma display, or any other display device that can be used appropriately with such a wireless telephone. For this exemplary embodiment, display **202** can be used to present and manipulate, among other things, a call tree or similar menu of options provided, for example, from an automated telephone answering system. Also, for this embodiment, wireless telephone **200** can include appropriate software to execute a Web browser and perform such processing functions as downloading and uploading data from and to the Internet, and similar other processing functions. As such, wireless telephone **200** can also perform the two-way communication functions of a typical wireless telephone.

Wireless telephone **200** may also include keypad **204**, speaker **206**, antenna **208**, and microphone **212**. Keypad **204** may be used to receive typed or cursor-like input from a user. Speaker **206** provides a mechanism for audio output,

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such as the voice audio of a party to whom the user of wireless telephone 200 may be speaking. Microphone 212 provides a mechanism for audio input such as for speaking to a called party. Antenna 208 provides a mechanism for establishing a wireless communications link between wireless phone 200 and a network, such as, for example, network 102 in **Figure 1**.

In accordance with a preferred embodiment of the present invention, wireless telephone 200 may also be an IP telephone, or alternatively, for example, a Voice-over IP (VoIP) telephone using packet-switching technologies. For this exemplary embodiment, a caller can dial the number of an automated telephone answering system associated with a particular service provider. A digital Private Branch Exchange (PBX), server, or gateway (not shown) can map the dialed telephone number to an IP address of an IP host associated with the automated telephone answering system.

In this example, it may be assumed that the IP host can be the automated telephone answering system involved. As such, a session can be established between the PBX, server or gateway associated with wireless telephone 200 and the called party's (e.g., automated telephone answering system's) IP host. For this example, wireless telephone 200 can be operated in accordance with an accepted VoIP protocol, such as, for example, the known H.323 Protocol or the known Session Initiation Protocol (SIP).

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For this exemplary embodiment, wireless telephone 200 can establish a session with a computer associated with the automated telephone answering system involved. Nevertheless, the use of wireless telephone 200 is for illustrative purposes only and not intended as an architectural limitation for the present invention. Any appropriate telephone (e.g., in **Figure 1**) that can function primarily to enable a user to interact with a call tree can be used to implement the present invention.

Turning now to **Figure 3**, a block diagram of a wireless telephone is depicted in accordance with a preferred embodiment of the present invention. Wireless telephone 300 is an example of a wireless telephone, such as wireless telephone 200 in **Figure 2**, in which code or instructions implementing the processes of the present invention may be stored and executed. Exemplary wireless telephone 300 includes bus 302 to which processor 304 and main memory 306 are connected. Display adapter 308, keypad adapter 310, storage 312, microphone adapter 318, audio adapter 314, and automatic answer unit 316 also are connected to bus 302.

For this exemplary embodiment, an OS runs on processor 304 and can be used to coordinate and provide control of various components within wireless telephone 300 in **Figure 3**. Instructions for the OS and applications or programs can be located on storage devices, such as storage device 312, and can be loaded into main memory 306 for execution by processor 304. Those of ordinary skill in the art will appreciate that

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the hardware in **Figure 3** can vary depending on the implementation. Other internal hardware or peripheral devices, such as flash ROM (or equivalent nonvolatile memory) or optical disk drives and the like, may be used in addition to or in place of the hardware depicted in **Figure 3**.

With reference now to **Figures 4A** and **4B**, related exemplary screens of display are depicted that illustrate principles of the present invention. For example, in accordance with a preferred embodiment of the present invention, the exemplary information shown in **Figures 4A** and **4B** can represent illustrative screens of display of call trees or menu options published (e.g., as an HTML or HTML-like page, Extensible ML (XML) page, WML page, etc.) by an Internet or other network service provider associated with an automated telephone answering system. Also, for example, the exemplary information shown in **Figures 4A** and **4B** can represent illustrative screens of display on wireless telephone 200 or other appropriate wireless telephones (e.g., wireless telephone 132, 140, 164), and/or a monitor for a computer (e.g., 120, 126, 134, 142). For this exemplary embodiment, it may be assumed (for illustrative purposes only) that the exemplary information of **Figures 4A** and **4B** are related, interactive screens for the display of wireless telephone 200 and interaction by a user of wireless telephone 200. In this regard, in accordance with a preferred embodiment of the present invention, exemplary screen of display

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**400b** in **Figure 4B** represents an expansion (e.g., with additional details) of menu item **402a** in **Figure 4A**.

Referring now to **Figure 4A**, for this exemplary embodiment, screen of display **400a** can represent an HTML or HTML-like web page that can be displayed on an IP phone (e.g., wireless telephone **200**) or a monitor associated with a computer that can be viewed by a user of a wire-line telephone, wireless telephone, data network telephone, or IP telephone. Alternatively, screen of display **400a** can represent a WML page, XML page or similar (web) page. For this example, it may be assumed that screen of display **400a** is displayed on a display device of wireless telephone **200**. Also, for illustrative purposes and ease of understanding, it may be assumed that wireless telephone **200** is wireless IP telephone **164** shown in **Figure 1**.

With reference now to **Figure 5**, a flowchart of a process for visually representing an interactive telephone call tree interface is depicted in accordance with a preferred embodiment of the present invention. As such, for this example, the process illustrated in **Figure 5** may be implemented by wireless IP telephone **164** (e.g., configured as wireless telephone **200**).

Exemplary process **500** begins by a user accessing a call tree of interest (step **502**). For example, the user can place a telephone call (e.g., with wireless IP telephone **164**) to a number associated with a particular service provider (e.g., Information Technology Services Call Center), and an automated telephone answering system

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can answer that call. Also, for example, the number called can be for a telephone associated with that service provider (e.g., for wire-line telephone 128), and the number and telephone also can be associated with a computer (e.g., computer 126) where an application for such an automated telephone answering system can reside.

Once an appropriate telephone connection is made between these telephones or telephone systems, an application running in wireless IP telephone 164 (or the user) can determine whether or not this particular telephone number and/or service provider has been called earlier (step 504). If not, wireless IP telephone 164 can display text describing this fact for the user. In response, the user (e.g., or software application running in wireless IP telephone 164) can initiate a download (e.g., with an internal browser) of the service provider's call tree (step 506). As described earlier, the downloaded call tree can be provided to wireless IP telephone 164 as an interactive HTML or HTML-like (e.g., WML, XML, etc.) page. As an alternative, the service provider's call tree can be input (e.g., manually keyed) directly into wireless IP telephone 164 as an interactive HTML or HTML-like page. Also, as another alternative, a speech recognition application running in wireless IP telephone 164 can be used for vocally inputting the interactive call tree into wireless IP telephone 164.

Next, the application running in wireless IP telephone 164 can display the downloaded call tree as the HTML or HTML-like page (step 510). An illustrative



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example of such a page for a call tree (or menu) is screen of display **400a** shown in **Figure 4A**. For this example, it may be assumed that a user of wireless telephone **164** can interact with and utilize call tree **400a** via keyed and/or cursor inputs to wireless telephone **164**.

Next, the user can decide whether or not to interact with, and/or access a node of, displayed call tree **400a** (step **512**). If not, at some pertinent point in time, the user can decide whether or not to terminate the call (step **514**). If the user decides not to terminate the call, then the flow can return to step **510**. Otherwise, the user can terminate the call if so desired.

For this exemplary embodiment, the user of wireless IP telephone **164** can decide whether or not to access a node of call tree **400a** by "hovering" (e.g., placing a cursor temporarily) over or highlighting a node of interest on the HTML or HTML-like page. Responsive to such a "hovering" or highlighting action for a node of interest, the browser in wireless IP telephone **164** and application associated with the displayed HTML or HTML-like page can generate a new display (e.g., new HTML or HTML-like page, or separate frame) including certain details regarding the node of interest. An illustrative example of such a new page for a node of interest in the call tree of **Figure 4A** is screen of display **400b** shown in **Figure 4B**.

For this exemplary embodiment, referring to screen of display **400b** of **Figure 4B**, it may be assumed that a

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user of wireless IP telephone **164** has "hovered" over node **402a** in screen of display **400a** of **Figure 4A**, and in response to the "hovering" action, a new page with certain details of node **402a** has been displayed as node **402b** of **Figure 4B** (step **516**). For this example, if the user of wireless telephone **164** decides to access node **402a**, the user can select node **402a** on the interactive HTML or HTML-like page in display **400a** of **Figure 4A** (step **518**). For example, the user can select node **402a** by performing a "clicking" function on node **402a** with a cursor on the display of wireless IP telephone **164**. Then, for example, the application of wireless IP telephone **164** can be placed in a "wait" queue for further user interaction with node **402b** in **Figure 4B**.

As an alternative, for this exemplary embodiment, the user of a wire-line telephone, wireless telephone, data network telephone, wireless IP telephone, etc. can select node **402a** for interaction by "clicking" on, or dialing, the number shown (e.g., 1-512-838-7777). As another alternative, appropriate tones representing that telephone number can be downloaded to an appropriate computer, and the tones can be played from a speaker of the computer to a mouthpiece of a telephone in order for that telephone to dial the telephone number shown.

Returning to step **504**, if the application running in wireless IP telephone **164** (or the user) determines that this particular telephone number and/or service provider has been called earlier, then the application (or the user) can initiate an action for wireless telephone **164**

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to retrieve a stored call tree node, such as, for example, node **402b** of display **400b** (step **508**). For example, the stored call tree node can be retrieved from storage **312** in **Figure 3**. The flow can then proceed to step **510**.

It is important to note that while the present invention has been described in the context of a fully functioning data processing system or system of communication networks, those of ordinary skill in the art will appreciate that the processes of the present invention are capable of being distributed in the form of a computer readable medium of instructions and a variety of forms and that the present invention applies equally regardless of the particular type of signal bearing media actually used to carry out the distribution. Examples of computer readable media include recordable-type media, such as a floppy disk, a hard disk drive, a RAM, CD-ROMs, DVD-ROMs, and transmission-type media, such as digital and analog communications links, wired or wireless communications links using transmission forms, such as, for example, radio frequency and light wave transmissions. The computer readable media may take the form of coded formats that are decoded for actual use in a particular data processing system.

The description of the present invention has been presented for purposes of illustration and description, and is not intended to be exhaustive or limited to the invention in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in

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the art. The embodiment was chosen and described in order to best explain the principles of the invention, the practical application, and to enable others of ordinary skill in the art to understand the invention for various embodiments with various modifications as are suited to the particular use contemplated.